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THE RELATIONSHIPS BETWEEN GNP AS AN
INDEX OF OUTPUT AND AS AN INDEX OF
WELFARE



by
CHRISTOPHER L.R. JAQUES

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled The Relationships between GNP as an Index of Output and as an Index of Welfare submitted by Christopher L.R. Jaques in partial fulfilment of the requirements for the degree of Master of Arts.

ABSTRACT

The national income and product accounts, as formulated in the National Accounts, may provide satisfactory information on the short-run behaviour of output, since it was for essentially short-run analyses that the output index was originally designed. The tendency has been however, to use long-run changes in the index for the purpose of drawing conclusions about how welfare has changed over time within an economy, and how welfare differs between economies. In this paper I have tried to demonstrate that these latter uses amount to a misuse of the output index.

I have examined some aspects of the construction of the index, and have shown that there are problems in interpreting the output index as a welfare index both from the point of view of how certain aspects of economic activity are treated in the Accounts, and from the point of view of aspects of economic activity that are excluded from the index either partially or entirely. In some cases I have suggested how one might modify the output index so that it may be a 'better' measure of welfare.

My conclusions are that to ask the output index for information about long-run welfare is to ask too much - it was not designed for that objective nor does it fulfil the requirements for meaningfully meeting that objective.

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INTRODUCTION

The National Accounts are designed along lines suggested by Keynesian models of income determination. They are designed primarily to yield information on the short-run behaviour of output. In this context, the following questions are most relevant in judging the adequacy of the Accounts: Do they provide a 'good' short-run index of output and its composition (composition here referring to those categories of output which take on particular significance in short-run macro-economic models)? Are the data provided by the Accounts 'good' indicators of short-run changes in output and its composition?

There has been, however, a growing tendency to use the Accounts for purposes other than that of a Keynesian-type analysis. Specifically, they have been used to draw conclusions about long-run changes in economic welfare, about policies aimed at increasing that welfare,¹ and about differences in

¹One does not have to turn solely to the 'developing nations' to find evidence of, to use Professor Mishan's term, 'growthmania'. With the establishment in Britain, in 1962, of the National Economic Development Council, and with the formulation of the National Plan, the growth of the Gross National Product has become the national objective: "when the Prime Minister," says Mishan, "talks with exaltation of a 'sense of national purpose' it goes without saying that he is inspired by a vision, a cornucopia of burgeoning indices." And Mishan goes on,

welfare among economies. That is policy makers have used changes in the index of output in an economy to infer changes in economic welfare over time, and differences in output indices among countries to infer indifferences in economic welfare among economies. A simple, though admittedly extreme, illustration can indicate the fallacy of making such inferences. Consider a structural change in an economy such as the replacement of a democratic system of government with a dictatorship. Under the democratic system people have leisure time to spend on activities of their choosing. Under the new regime, which emphasizes the production of investment goods, people are required to work longer hours. In view of the fact that the output measure ignores associated changes in other aspects of economic activity, in this case the change in hours worked, one would be hesitant to accord to the change in welfare the same sign as is given to the index of output.

While the above was a rather extreme example, this paper will demonstrate that, for a variety of more plausible and significant reasons, the connection between long-run changes in economic welfare and long-run changes in output (or

"If the country was ever uncertain of the ends it should pursue, that day has passed. There may be doubts among philosophers and heart-searching among poets, but to the multitude the kingdom of God is to be realized here, and now, on this earth; and it is to be realized via technological innovation, and at an exponential rate ... For if we become richer, surely we shall remedy all social evils; ...

(see E.J. Mishan, The Costs of Economic Growth, (Middlesex, England: Pelican Books, 1969), pp. 27-33.

an index of output) is rather tenuous. In other words, this paper will show that conclusions about long-run changes in economic welfare that are drawn from an examination of national income data are likely, at best to be misleading.

The methodology of the paper is to outline several situations where the National Accounts can yield incorrect information of welfare - where the inference that welfare has increased because the output measure is now larger is invalid.

Chapter one examines the question of why market prices and factor costs are used as the valuation agents in the Accounts. The reasons that this question of valuation was selected for discussion are, firstly, that it constitutes one of the two broad questions which have to be settled before the Accounts can be drawn up, and secondly, that if the degree of monopoly power or other imperfections in the economy increase over time, or vary significantly across economies, then the very measure of output itself may fall apart.

Each of chapters two through five is devoted to an aspect of economic activity which presents problems for welfare conclusions, given how they are treated in the Accounts (which in the extreme case can mean that they are ignored). Chapter two deals with the question of the intermediate output of government, and with the interpretation of taxes. The distinction between final and intermediate services in general is a fundamental distinction in national income accounting.

From a welfare point of view the problem is that if the intermediate services of government are included in the output measure, and if the mix of government final and intermediate services change over time, or is different between countries, then welfare conclusions derived from an examination of the output index will be biased upwards. Related to this question of intermediate output is the question of the interpretation of taxes. What has to be determined here is whether taxes represent some additional value, apart from the recorded value of the goods and services produced, or whether they represent a value already included in the value of those goods and services.

Chapter three deals with the question of those expenditures made by an individual in connection with his work. The fact that a worker may have to incur expenses so that he can earn an income is of obvious importance in the calculation of that individual's income that can be spent on goods and services which he desires for final consumption purposes. The basic implications of the existence of occupational expenses for welfare are, firstly, should they be deducted from income because, in some sense, they represent a sort of intermediate input, and secondly, what will be the impact on welfare conclusions drawn from national income data if they change over time within an economy or differ between economies.

Chapter four deals with the question of externalities. The reason that this aspect of economic activity was examined

three questions associated with the treatment of capital in the Accounts. The first question is that of capital goods purchased by the household. The problem is that these goods are recorded as consumption expenditures rather than as capital acquisitions. Accordingly no depreciation is calculated to offset the gradual using-up of these purchases. From a welfare point of view this means that if the mix of purchases of capital and consumption goods, by the household, changes over time, output and welfare need not move in the same direction. The second question in this section deals with the treatment, or lack of treatment, in the Accounts of natural resources. As the Accounts are currently constructed the only entry associated with natural resources in the capital sections of the Accounts is that of the machinery, equipment, and construction associated with the exploration and development of the resource. As the resource is extracted the value of the extracted portion is included in consumption or in inventories. There is no entry in the Accounts which records the fact that the resource is depleted. In the opinion of the author this latter point is a pertinent consideration when changes in the index of output is used for welfare purposes. The third question in this section looks at the problems that can arise when the national accountant and the business accountant disagree as to whether an expenditure made by a firm should be expensed or capitalized. One reason why such a disagreement may arise is that tax laws dictate how

the firm is to handle an item, while other guidelines dictate the procedure for the Accounts. It will be shown that should tax laws, for example, change over time, or be different between countries, that this will bias the changes or differences in the output indices, and thus any welfare conclusions drawn from these indices will also be biased.

Before commencing the discussion of the valuation of output, a few general comments will be made.

Firstly, if one takes national income to be, in some sense, a measure of economic welfare, and if one is concerned with examining long-run changes in the components of national income, institutional changes, as well as changes in the index itself. As examples, one needs to know how the mix of consumer expenditures on durables and non-durables has changed over time, and whether tax laws governing the procedure of expensing capital items has changed. On the other hand, if one is interested in making international comparisons of welfare using the output index, then what one has to know is what the actual components of national income are, how they are defined in each of the countries, and what the institutional frameworks of the countries are. As a simple example, if one country included the activities of the household in its index of output, while another country omits that aspect of activity, then the indices of the two countries are non-comparable as they stand.

Secondly, the Accounts are concerned with economic activity, not with activity in general. Further, they are concerned with only a limited aspect of economic activity. For example they are concerned with the quantity of output, but not overly much with the way by which it is produced. Accordingly, any welfare conclusions drawn from an examination of national income data will at best be relevant only to a small subset of general social welfare. One should not ask too much of the Accounts. Indeed it was in recognition of the fact that the Accounts can yield, at best, only very limited information on economic welfare, and even less information on welfare in general, that provided the impetus for the development in the United States of the so-called 'social indicators'. These social indicators look to be a most promising area in the search for welfare measures, and more will be said of them in the final chapter of this paper. They are mentioned here lest the reader think that the only measure of welfare available are the national income statistics.

CHAPTER I

THE QUESTION OF VALUATION

For goods to appear in the market place they must exhibit certain characteristics, namely "unless an object is a source of satisfaction, relatively scarce, and disposable, it is not bought or sold. Marketability implies these three characteristics and adds an important fourth, viz., that goods are involved in the complex of social relations that are of special concern to economic study."¹ One can add also that the fact of marketability implies 'economic value', but the latter does not imply the former (The significance of this final point is that the existence of economic value without that value being reflected in a price is the justification for imputations).

It is the existence of this economic value that permits the movement from items expressed in physical terms to items expressed in monetary terms. Physical items appearing on a market are valued in the Accounts at the price they bring in that market. With respect to the nonmarket imputations that are made, the search is for a proxy for the market price. Thus, for example, if there was a market price for government

¹Simon Kuznets, National Income and Its Composition, 1919-1938, National Bureau of Economic Research (New York: H. Wolff, 1941), 1, 7.

services, this price rather than the proxy of factor costs would be used.

To be specific about how market prices reflect economic value, the idea is that consumers weigh relative market prices against their marginal rates of substitution for the goods. That is, the slope of the consumer's budget constraint is, in equilibrium, tangent to an indifference curve, and therefore relative prices give a measure of relative marginal utilities to the buyer.² And market prices are used as the valuation agent because they yield this information on marginal utilities.

There is however another way in which economic value can be measured: as the cost of the inputs used to produce the commodity. Thus rather than multiply physical goods by their market price it is possible to sum all the factor payments that were incurred in producing the goods. And in an economy where there are no indirect business taxes or subsidies the two methods of valuation will yield the same total.

The objective of this chapter is to illustrate the rationale and uses of the two methods of valuation, and to indicate a few of the areas in which the valuations fail to measure what they are intended to measure. It is also hoped

²J.R. Hicks, "The Valuation of Social Income," Economica, new series, VII (May, 1940), p. 113.

It should be noted that the argument in the text implies that the consumer has a free choice in the market. If there is any imperfection that prevents the consumer from attaining tangency, then prices yield little information about marginal utilities. Hicks, of course, recognized this.

that it will be made clear that one should be careful in interpreting the fact that under certain circumstances the two totals will be the same: the factor cost method and the market price method of valuation stand on their own feet.³

Economic Activity at Factor Cost

One of the uses of a measure of national income is the information that it can yield regarding resource allocation. To answer questions about resource allocation one requires information concerning the marginal productivities of the factors of production, or about the marginal costs of the products (which is the same thing).

It will now be shown that in an optimally organized perfectly competitive system, output prices will yield the required information. For ease of exposition a two factor, two commodity model will be considered.

If a competitive system is optimally organized, the economy will be, in this model, at that point on the production frontier where the price line representing the ratio of output prices is tangent to the boundary. It is further known that since the production possibility boundary is a mapping into output space of the contract curve of an Edgeworth Production

³It is with respect to the market price valuation that it is valid to make the statement that in using factor costs to measure, say, government output, that these factor costs are a proxy for market prices. In a pure factor cost evaluation of income this statement is naturally not correct. The section on Economic Activity at Factor Cost will make this clear.

Box, that is true that in real terms,⁴

$$(1) \quad \frac{MPP_L^x}{MPP_K^x} = \frac{MPP_L^y}{MPP_K^y} = \frac{P_L}{P_K}$$

In money terms (1) above implies the following four relationships,

$$(2) \quad \text{i.} \quad MPP_L^x \cdot P_x = P_L$$

$$\text{ii.} \quad MPP_K^x \cdot P_x = P_K$$

$$\text{iii.} \quad MPP_L^y \cdot P_y = P_L$$

$$\text{iv.} \quad MPP_K^y \cdot P_y = P_K$$

With respect to (2) i, this can now be divided by MPP_L^x to obtain

$$(3) \quad P_x = \frac{P_L}{MPP_L^x}$$

But the right hand side of the expression is simply the marginal

⁴The symbols used are defined as follows:

MPP_L^x	-	Marginal Physical Product of Labour in the Production of good x.
MPP_K^x	-	Marginal Physical Product of Capital in the Production of good x.
MPP_K^y	-	Marginal Physical Product of Capital in the Production of good y.
MPP_L^y	-	Marginal Physical Product of Labour in the Production of good y.
P_L	-	price of labour.
P_K	-	price of capital.
P_x	-	price of good x.
P_y	-	price of good y.
MC_L	-	marginal cost of labour.
MC_K	-	marginal cost of capital.

cost of good x - the amount of good y that must be given up in order to obtain one additional unit of good x.⁵

The import of the above is that a market price valuation of output is sufficient to yield the required information about marginal costs; there is no need to go beyond a market price valuation. But it is also clear, as Bowman and Easterlin note, "that a market price valuation of the product would not be satisfactory for these purposes (of resource allocation) if market prices deviate from marginal costs."⁶ In this case one has to return to expression (1) above, which means that one has to obtain information about the actual payments received by the factors of production - one needs a factor cost evaluation of output.

But there are problems even here. To be perfectly general expression (1) should be written

$$(4) \quad \frac{MPP_L^X}{MPP_K^X} = \frac{MPP_L^Y}{MPP_K^Y} = \frac{MC_L}{MC_K}$$

In perfect competition in all markets the right hand ratio is equal to the ratio of factor prices - expression (4) is the same as expression (1). But if there are imperfections in the

⁵The reader will recognize that expression (3) is the reason for suggesting that marginal cost pricing, i.e., setting price equal to marginal cost, will achieve an optimally organized economy, or more specifically, a Pareto Optimal.

⁶Raymond T. Bowman and Richard A. Easterlin, "The Income Side: Some Theoretical Aspects," in A Critique of the United States Income and Product Accounts, Studies in Income and Wealth, Vol. XXII (Princeton: Princeton University Press for National Bureau of Economic Research, 1958), p. 171.

input market the two expressions are different and expression (4) and not expression (1) is relevant.

It follows then that a factor cost valuation will be sufficient for resource allocation purposes provided that equilibrium exists and provided that there is a perfectly competitive input market. If the input market is less than perfectly competitive however, a factor cost valuation will fail to account for this and factor price ratios will not give a correct indication of the ratio of marginal productivities. Accordingly resource allocation decisions based upon a factor cost valuation of income in an economy where there are imperfections in the input market will be misleading, in that they will not adequately reflect opportunity costs.

Economic Activity at Market Prices

It has already been indicated that the rationale for using market prices as a valuation agent is that in equilibrium the consumer sets the ratio of market prices equal to the ratio of his marginal utilities. More properly, in the n-good case the equivalences are,⁷

$$\frac{MU_i}{P_i} = \frac{MU_2}{P_2} = \frac{MU_n}{P_n}$$

Given price information and the assumptions of utility maximization (again the 'normal' assumption), there are two

⁷The symbols used are as follows:

MU_i - marginal utility of good i.

P_i - price of good i.

approaches that, although interdependent, can nevertheless be treated distinctly and discussed independently with respect to why the above equivalence condition constitutes useful information.

The Index Number Approach

Following Hicks,⁸ this approach can best be presented by first stating the problem. In situation one, an individual buys a certain bundle of goods and services at a certain set of prices. In situation two, this same individual buys another bundle at another set of prices. Given the prices and quantities relevant for both points of time, can anything be said about the individual's welfare?⁹ No additional information is available regarding his indifference map.¹⁰

The test for being better off in period two as compared to period one is that in period two the individual purchased a bundle of goods different from the bundle that he purchased in period one, while in period two he could have purchased the bundle he selected in period one. Further, in period one he could not have purchased the period two bundle. The reasoning is analogous, mutatis mutandis, with respect to situation one being better than situation two. One has, then, the usual

⁸See Hicks, "The Valuation of Social Income."

⁹Initially the problem will be couched in terms of the individual. It is assumed that tastes remain constant, and that total income equals total expenditure.

¹⁰In reality the question is attempted without information about the actual physical quantities involved, but only with prices and total income known.

revealed preference assumptions. In the above example, the individual's behaviour revealed that he must prefer the second bundle to the first.

Since it is assumed that expenditure equals income it is possible to deduce whether the individual is better off by examining the change in his real income. Specifically, situation two, in which X_1^2, X_2^2 was purchased at prices P_1^2, P_2^2 respectively, is said to be better than situation one, where X_1^1, X_2^1 was purchased at prices P_1^1, P_2^1 respectively, if and only if,

$$\sum_i P_i^2 X_i^2 \geq \sum_i P_i^2 X_i^1 \quad \text{and} \quad \sum_i P_i^1 X_i^2 \geq \sum_i P_i^1 X_i^1$$

It is to be recognized that if this condition does not hold, it does not follow that the individual was worse off, but only that it is impossible to make any statements given the price-quantity information. It is therefore quite possible for the individual to behave in a manner, which while perfectly consistent with utility maximization, does not meet the above requirement. In order to draw welfare conclusions in that case knowledge of the indifference map, at least in the neighbourhood of the bundles selected, is required.

The logic behind the approach is that the actual indifference curves of the individual, one curve through each bundle, are replaced by straight lines indicating the price ratio. The sanction for this procedure is that for a particular bundle selected, the price ratio that prevailed when that bundle was selected is equal to the slope of the actual indifference curve

at that bundle (a 'point' in commodity space). Thus at least one point on the actual indifference curve is known. Of course, in the case where the true indifference curve differs from this linear surrogate, then conflicting results may occur. The surrogate map may show that real income has increased when in fact it has decreased.¹¹

In moving from a discussion of the individual to a discussion of the welfare of society, the analysis is open to additional criticism. This criticism is based primarily on the logical difficulties inherent in the so-called 'compensation principles' which are implicitly embodied in the group analysis.¹² But there are more fundamental problems. Firstly, an index number analysis must assume that the group of individuals comprising society remains unchanged. Secondly, the analysis assumes that individuals trade at fixed market prices - if this were not true then the true indifference curve of the individual could not be replaced by the linear surrogate. Thirdly, in reality the actual bundles selected and the actual prices are not known. What is done is "to reckon the total money expenditures and correct for changes in prices by the

¹¹William J. Baumol, Economic Theory and Operations Analysis (New Jersey: Prentice-Hall, Inc., 1965), p. 204.

¹²For a complete analysis of the various compensation principles, see, J. de V. Graaff, Theoretical Welfare Economics (London: Cambridge University Press, 1967).

The essence of the compensation principles is that they attempted to extend the scope of the Pareto ranking, thus trying to compare an original situation to a new situation where one person was made worse off. The problem with the principles is that they fail to achieve this extension.

use of a price index number".¹³ But the shifts in the level of market prices do not affect the prices of all goods either simultaneously or equally,¹⁴ and yet this is what is assumed in the use of price indices, since these indices have relation to a particular bundle of goods and yet are extended to cover goods not specifically included in the index.

The Market Demand Curve Formulation

In a perfectly competitive system the market demand curve is a measure of the social importance of a good. It is a measure of what the consumers in the economy are willing to pay in order to obtain a certain amount of good.

The actual derivation of the demand curve utilizes the same assumptions as the index number approach.¹⁵ And the assumption that the consumer is a utility maximizer is the key to the analysis. But while the demand curve can be viewed as the solution to a simple maximization problem, it is the configuration of tastes that locate, for each individual, each indifference curve in his map, and it is the distribution of income that locates for each consumer his budget constraint.¹⁶ Accordingly, to state that the market demand curve is a measure of the social desirability of the good implies that there has

¹³Hicks, "The Valuation of Social Income," p. 111.

¹⁴Kuznets, National Income and Its Composition, p. 28.

¹⁵Accordingly what is said here applies equally to the index number formulation, and vice versa.

¹⁶A market demand curve is simply a horizontal summation of the individual firm supply curves.

already been some ethical judgement made about the distribution of wealth. As Kuznets notes,

No one supposes that the distribution of income parallels the distribution of wants or satisfactions ... Therefore we cannot claim that our estimates of national income, based as they must be on market valuations, evaluate goods as a means of satisfying directly or indirectly the present or future needs of the population.¹⁷

The existence of imperfections in the market introduces additional problems into the market price valuation. Hopefully marginal cost is a measure of what the economy must pay for an additional unit of output. In the case where the input market is competitive, marginal cost will be this necessary cost, but if this market is less than perfect this will not be the case.

But even given perfection in the input market, distortions can occur in the output market. To illustrate the problem that arises in this situation, note that in perfect competition producer equilibrium occurs where output price equals marginal cost. What consumers are willing to pay and what they have to pay are the same. But if a monopoly exists then price exceeds marginal cost and the consumer pays more than is necessary. Kuznets suggests that it "... may be argued ... that the existence of monopolies distorts price relationships and introduces an element of incomparability between goods sold on competitive and on monopolistic markets." He goes on to argue, however, that prices as they exist must be accepted if the accountant "bases his estimates upon the accepted notion

¹⁷Kuznets, National Income and Its Composition, pp. 24-25.

of society." This statement is predicated on the assumption that society "exercises whatever power it sees fit in governing prices and other policies."¹⁸

This view seems a little naive for several reasons. Firstly, monopolies though they may be considered undesirable, may exist undetected in the system. Secondly, if a monopoly is suspected there is generally a long delay between its initial detection and its removal. Thirdly, the enthusiasm with which monopolies are fought seems not to be a direct function of society's wishes but of the institutions whose job it is to police this aspect of the economic environment. Nor does it seem acceptable to argue against this last point on the grounds that society should insist on a more active anti-trust campaign if this is what is desired. Even in the democratic system the time lag between public demands and government action is unfortunately long.

Conclusions

It is obvious from the above that when one interprets factor prices as a proxy for marginal productivities, and market prices of commodities as a proxy for marginal utilities, that there are some relatively strong assumptions that have to be made regarding the functioning of the economic system. If any of these assumptions are violated, then the prices determined in the system do not reflect what they are desired to reflect.

¹⁸Ibid., pp. 26-28.

Perhaps the most stringent assumption is that there be universal perfect competition. That this assumption is not met in reality is well known, but nevertheless it is the assumption under which most of welfare economics is discussed. When imperfections exist they are merely said to distort the perfectly competitive results. Sometimes it can be demonstrated in which direction the distortion occurs, for example, by the introduction of a degree of monopoly power into the system. But there are no quantitative measures; one is unable to say by how much the imperfection distorts the competitive results. Accordingly, it is not possible to indicate to what degree prices are misaligned unless one knows what the situation would be under a competitive system. This means the use of a sophisticated computer which would calculate the shadow prices. One can appreciate the magnitude of this problem if one considers just one of the questions that must be answered in order to write the computer program: "How many firms make up a perfectly competitive industry?"

It follows then that if the assumptions of the model fail to hold it is not possible to value output at market prices and then proceed to discuss economic welfare, and it is similarly not possible to make a factor cost valuation and proceed to discuss opportunity costs and resource allocation.

Notwithstanding these conclusions however, it is difficult to think of alternative valuation agents. Perhaps this will be possible in the future as estimation techniques become more sophisticated, particularly in view of the fact that it

is known what is to be measured. But for the present it must be recognized that the valuations now made can impart misleading information to the analyst.

CHAPTER II

THE TREATMENT OF THE GOVERNMENT SECTOR

Having discussed the valuation principles and some of their interpretational limitations, concern now turns, in this and the subsequent three chapters, to focus on some specific aspects of the index of output. This chapter is a discussion of the treatment of the government sector.

The treatment of the government sector in the National Accounts has received no thorough exposition in the literature. Palmer notes that in volume XXIII of the Studies in Income and Wealth series that the "subject of national income contains 41 noncontiguous references to the subject of government and taxation - on 126 pages of the total 582 - but no single article on the subject as such."¹ This is just one indication of the lack of a comprehensive treatment available. Whatever the reasons, and Palmer suggests several, the very size of the sector would indicate that it should be subjected to close appraisal.

The objective in this section is to discuss just two of the many problem areas associated with the government sector:

¹Edgar Z. Palmer, The Meaning and Measurement of the National Income (Lincoln: University of Nebraska Press, 1966), p. 373.

Although an attempt will be made to treat the two areas separately, certain topics will be discussed jointly so as to avoid repetition.

the question of taxes and the question of government 'free' services (i.e. those services that do not flow from government enterprises). The reason that these two areas have been chosen for discussion is that they bear heavily on the question of the intermediate services of government. And the question of intermediate services is fundamental to the construction of an output index, whether that index is used for welfare purposes or not.

The current treatment of taxes involves their division into two main groups: direct taxes and indirect taxes. The theoretical distinction seems to be that those whose incidence is shifted forward to the consumer are indirect. That is, they are regarded by the firm as an expense item in its operating statement. Taxes that are shifted backward to the factor of production are direct taxes. In the National Accounts there are only the two types.

From the point of view of resource allocation the need for some distinction appears obvious. One requires information on factor payments in order to get at the question of marginal productivities. But whether or not tax incidence forms a satisfactory basis for this distinction is not clear. For example, Jaszi would fault those who concentrate solely on the incidence of a tax and who would include in factor incomes only those that are backward shifted. He states that he would include corporate income tax in factor incomes even if they were shifted backwards "providing the shifting occurred

within the framework envisaged by marginal productivity theory."² This is most certainly a valid point of view: if taxes are somehow shifted backward to the employee (or any other factor for that matter) and such shifting is ignored by the employer when he sets his payment to the factor, then it would be incorrect to increase the factor's income by the amount of the incidence of the tax in order to obtain a measure of productivity. To get at questions of productivity what is required is information on what the employer regards as the factor payment. As will be indicated later, the operational method of determining indirect and direct taxes obviates the need to worry too much about this point.

From a welfare point of view, as was indicated in the last chapter, the correct valuation agent is market prices. For it is true that whatever the market prices are, it is the ratio of those prices which the consumer must weigh against his marginal rate of substitution if he is to maximize his utility. Accordingly, the question of tax incidence does not affect the logic of using market prices, as they actually exist in the market, as the valuation agent.

The prime interest of tax incidence for welfare considerations is in their distributional effects on income within

²George Jaszi, "The Conceptual Basis of the Accounts," in A Critique of the United States Income and Product Accounts, Studies in Income and Wealth, Vol. XXII (Princeton: Princeton University Press for National Bureau of Economic Research, 1958), pp. 111-112.

an economy. Thus, for example, by increasing the amount of indirect taxes relative to direct taxes, the burden for supporting government activity will fall relatively more heavily on the consumer. Of course this may be considered a desirable state of affairs in that it may be that output of government yield the required positive utility to the consumer, and it could therefore be argued that rather than other sectors subsidizing the consumer, the consumer should be made to pay. Any changes that occur over time in tax incidence within an economy, and differences in tax incidence between economies, is, then, certainly of interest from a welfare point of view.

As far as the National Accounts are concerned, however, there is an additional problem. To illustrate this problem the operational method of distinguishing between direct and indirect taxes will now be examined, followed by a discussion of the interpretation of these taxes.

In practice the question of how to treat a tax is not determined by close analysis of incidence, but rather by business accounting procedures. Thus one finds, for example, in the Canadian Accounts, the following procedural statement,

Business accounting procedures provide a guide as to whether a tax is to be regarded as direct or indirect. Thus, all sales taxes and all taxes which are deductible as expenses from the gross revenue of business (such as property taxes) are taken as indirect. Taxes which are levied directly on net incomes, whether of individuals or corporations, are regarded as direct taxes.³

³ Dominion Bureau of Statistics, National Accounts Income and Expenditure, 1926-56 (Ottawa, Ontario: Queen's Printer and Controller of Stationery, 1958), p. 113.

This procedure would appear to satisfy Jaszi in his quest for a productivity measure, for this method permits a measure of what the employers regard as their payments to those factors. But it is worth noting that prior to 1947 the Accounts of the United States presented corporate net income taxes as indirect. Accordingly, if those figures were used as a guide to the reallocation of resources, Jaszi would say that the guide was wrong. Perhaps the matter is not as well defined as it seems. Nevertheless, it is clear that the operational method of distinguishing between the two types of taxes is closely allied to business procedure.

What one now has to do is pose the question of how taxes should be interpreted - what do taxes represent? An attempt to answer this question will now be made, but first a general note on intermediate goods.

As a basic principle in national income accounting, only the final output of the economy is recorded. The value of a loaf of bread which is sold on the market for final goods is included, but not the value of the flour which is embodied in the value of the bread. To include both the value of the bread and the value of the flour would be to double count, or duplicate, the value of the embodied flour.

It is well at this point to make clear what is meant by an intermediate input. It is simply an input whose value is embodied in the value of some other final good. Then accounting for the value of the final good automatically accounts

for the value of the intermediate good. Accordingly, to state that intermediate products are not accounted for in the Accounts is an oversimplification - they are implicitly included. It follows that if a good is produced in this accounting period to be used as an input in the next accounting period, that the value of that good should be included in this period, since its value was produced in this period. The procedure is to record the good as an increase in inventories this period, and when it is embodied in the value of a final good next period, as a decrease in inventories. This treatment will insure that the good is not counted in both periods.

The principle of recording only final goods should apply equally well to the government sector of the economy as to any other sector. If there exists intermediate government services and these are regarded as final products by the national accountant, then the national output figures will be overstated.

Given these general observations about the nature of final and intermediate products, one is now in a position to attempt the interpretation of taxes. To do this a model will initially be considered in which the government is assumed to have a balanced budget. The source of revenue for the government is direct taxes.

In an economy with no indirect taxes and a balanced budget, the value added of a firm is the sum of its factor payments. The sum of the value added of all firms in the

economy will result in a total that can be called the National Income at Factor Cost. If the government is regarded as producing final products, then the payments that it makes to the factors that it employs will be included in this total. If one now proceeds to value all the final outputs of the economy at market prices, and here one would include the government purchases from business and the government purchases of factors of production, another total will be arrived at which can be called the Gross National Expenditure at Market Prices. It will then be observed that the two totals are the same - one has struck the balance between income and expenditure so dear to the heart of the accountant.

If now indirect taxes are introduced into the model, the above accounting will not produce a balance because indirect taxes are included in the market price of goods but are not factor costs. That is, as far as the producer of a good is concerned, the costs that he incurs include both direct and indirect taxes. Following the operational definition, indirect taxes are included as specific items in the profit and loss statement of the firm. They are then reflected in the supply curve of the firm, and thus in the price that the consumer will pay for that firm's product. Direct personal income taxes are implicitly included in the profit and loss statement since it is of no concern to the producer how much personal income tax his employee pays. As far as the producer is concerned he pays his employee a gross income. This wage bill

therefore includes these direct taxes. Similarly with profit: the gross profit of the firm is what is included in the market price of the output of the firm. But while indirect taxes are included in the market price they are not a factor payment. Thus, Gross National Expenditure at Market Prices will exceed the factor cost measure of output by the amount of these indirect taxes.

The treatment of these indirect taxes at the hand of the national accountant is straightforward: they are added to the National Income at Factor Cost figure to obtain the desired balance between the two sides of the Accounts.

Concentrating on the expenditure side of the Accounts, the treatment implies two things. Firstly, there is no differential treatment between direct and indirect taxes, and secondly, that all the output of government is regarded as final product. The government is not presumed to supply any intermediate services to business. Now this does not mean that there is no relationship between business and government, all it means is that in the market price of a good there may be values, the value that government provides to the firm, which are not reflected in the market price. One way of thinking of this question is to view the consumer as purchasing a good, part of the value of which is incurred by business and paid for in the market price, and part of which is borne by government and paid for in other ways.

If it was true that in fact the government did not

produce any intermediate goods, then it would be correct to include all the taxes in the Accounts as per the present treatment. The reason being that the consumer would in fact be purchasing some value in addition to the value represented by the market price of the business-produced good. On the other hand, if the government does produce intermediate products, then the present treatment of taxes is not correct since there is duplication of value in the Accounts.

The welfare implications of the existence of intermediate government output, given the present treatment of taxes, is that should the mix between intermediate and final government output change over time within or between countries, or simply be different between countries, then using the changes in indices of output to infer changes or differences in welfare is invalid.

The treatment of government production in the Accounts is in part dependent upon how the national accountant views the role of the government in the economy and in the society. There are three views that can be taken of this role: that government output represents intermediate products, that it represents final products, and that it represents a mixture of intermediate and final products. These three views will now be briefly discussed.

The idea that all government services represent intermediate products has as its major premise a view that the government provides the necessary prerequisites for the functioning

of the economy. Thus Matolcsy and Varga write,

... the machinery required for keeping order and securing safety, as well as the whole civil service, do not produce values in addition to the flow of consumers' goods, but ensure only the maintenance of the present economic and social order and the maintenance of the present level of production. The values that these services produce are already included in the value of consumption goods (material and immaterial).⁴

The problem with this viewpoint is that the government does generate output which does yield "values in addition to the flow of consumers goods." 'Value' in this context is synonymous with 'utility'. To argue that a government-provided highway yields zero utility to all who use it is an empirically refutable view.

Those who have advocated that all government services are final seem to have done so on the basis that it is statistically difficult to isolate that portion of government output that is intermediate. However Hicks, for example, later came to feel that the statistical problems were not as great as he had originally thought.⁵ And while Colm wrote

⁴Mattias Matolcsy and Stephen Varga, The National Income of Hungary 1924/25 - 1936/37 (London, 1938), p. 6, quoted in Paul Studenski, The Income of Nations. (New York: New York University Press, 1958), p. 196.

⁵J.R. Hicks, "The Valuation of the Social Income - A Comment on Professor Kuznets' Reflections," Economica, new series, XV (August, 1948), p. 164.

The reason that Hicks gives for changing his mind is some correspondence with Professor Hart about The Social Framework of the American Economy. Also, Professor Hicks' wife demonstrated to him that it was possible to make a significant classification of government output along the lines of intermediate and final product.

that he thought that to try and estimate the amount of intermediate government services would involve introducing an error into the accounts that was larger than that which is there by including the intermediate products, he nevertheless admitted that such intermediate services did exist.⁶

The most widely accepted view, at least in the Western World, is that the output of government represents a mixture of products, some intermediate and some final. And if there are intermediate products these should be excluded from the output figure. Again, all that this means, from an interpretational point of view, is that when taxes are paid to the government, the government does not use these taxes to produce values in excess of the market price of a privately produced good. Some of the taxes represent true intermediate products, as defined above, and these intermediate products are reflected in the market price of the good in that their cost is included in the tax elements of the private producer's costs. An example will illustrate this point.

Consider the provision of police protection provided by government and financed out of taxes collected from producers. The taxes are included in the market price of the goods produced in the private sector; they are recorded once in the Accounts because of this. Now some of the police protection is used to protect the firms which produce the goods, and

⁶For a more complete presentation of the various viewpoints see Paul Studenski, The Income of Nations, pp. 196-201.

some is used to protect the consumer. The consumer obtains utility from the privately produced goods and from the police protection to himself. The price he pays for the privately produced goods is a measure of utility obtained from them, and the portion of taxes that are used to provide the police protection to him is a measure of the utility obtained from the police protection. He does not obtain utility from the fact that the firm is protected. Accordingly, since the portion of taxes collected for the firm and used to provide protection for the firm is included in the market price of the good, to include the firm's protection again, in the government production figure, would be to double count.

It has at various times been argued that it is indirect taxes, or a portion of indirect taxes, that represent the government intermediate services to business. Kuznets,⁷ for example, suggested that all indirect taxes represented intermediate output and should accordingly be deducted from our current measure of output. This is certainly an explanation of the dichotomy between Gross National Income at Factor Cost and Gross National Expenditure at Market Prices. But what this treatment entails is that not only does one have to admit that not all government output is final, but one has to take the next step and argue that the non-final portion is identically equal to indirect taxes. The most obvious criticism

⁷Simon Kuznets, "Government Product and National Income," Income and Wealth, Seq. 1 (Cambridge, England: Bowes and Bowes for International Association for Research in Income and Wealth, 1951).

that can be levelled against this reasoning is that the decision as to whether tax revenue is to be raised directly or indirectly is "generally based upon political considerations having nothing to do with the question as to who is the beneficiary of the services of government."⁸

Accordingly, it is suggested that the question of these services of government should not be addressed solely to indirect taxes, but to taxes in general. Indeed it seems that to equate indirect taxes with these intermediate services is really to offer an explanation, albeit an economic explanation, to the accounting problem of how to strike a balance between the two sides of the account. But since the national accounts are economic accounts, the treatment of all items must be justified on economic grounds and the accounting methodology modified so as to reflect the economic rationale, not vice versa. Thus, what is required in the treatment of government is an evaluation of the role that the sector plays in the economy. Nor does this call for special treatment, merely equal treatment with the other sectors.

In all fairness to Kuznets it should be allowed that he later modified his view about the equality between indirect taxes and intermediate government output. He later proposed a list be made of government services.⁹ This list would segregate

⁸Paul Studenski, The Income of Nations: Theory, Measurement and Analysis, (New York: New York University Press, 1958, p. 202.

⁹Kuznets, "Government Product and National Income," p. 190.

those services that are final from those that are intermediate to business. Then the latter services would not be included on the expenditure side for the same reason that he originally proposed the exclusion of indirect taxes: that their inclusion represents a duplication of values.

In the opinion of the author, the compilation of such a list is what will ultimately have to be done if one is prepared to admit of the existence of intermediate government services. And as the government grows in importance in the economy, providing more and more intermediate services, the need for such a list becomes increasingly important.

Of course the main problem of compiling such a list is statistical rather than theoretical: the government does not provide one road for the use of business and one for the use of the consumer, the same road is used by both agents. And one would then have to make some sort of estimate as to the division of use. This is just one of the statistical problems that led the National Accounts Review Committee of the National Bureau of Economic Research to conclude that

an attempt to differentiate intermediate from final product in the government account would give raise to too many controversial questions of classification to be embodied in the near future into the official national accounts. The committee also is uncertain whether the refinement resulting from eliminating a possible source of double counting would outweigh the possible introduction of additional sources of error. After weighing the arguments on both sides the committee thus decided it could not endorse separation and exclusion of intermediate

government services from national product.¹⁰

This view should not be taken lightly. There were many eminent scholars who were members of the committee. Notwithstanding this however, the author still feels the necessity of a list. There is still too much confusion that revolves around the intermediate services to argue otherwise. For example, Palmer indicates that the exclusion of indirect business taxes from the left hand side of the accounts "can be considered as an offset against the duplication of intermediate government product. We do not have to accept the equality of such business taxes with intermediate government production to see that this is an offset."¹¹ This would appear to mean that Palmer would use a figure net of indirect taxes when evaluating the output of the economy. Hagen and Budd, on the other hand, indicate that in the absence of a list

net national product as now defined is, we believe, a better measure of the nation's output than national income which excludes indirect taxes. We base this preference simply on the observation that the intermediate services of government tend to be a more stable proportion of the nation's output than indirect taxes. This, of course,

¹⁰National Accounts Review Committee of the National Bureau of Economic Research, Report of the Committee, The National Economic Accounts of the United States: Review, Appraisal and Recommendations (Washington: United States Government Printing Office, 1958), p. 79.

¹¹Palmer, The Meaning and Measurement of the National Income, p. 376.

a purely empirical, and not in the least conceptual judgement.¹²

So whereas Palmer would use net national income as the index of output, simply because exclusion of indirect taxes pays lip service to the notion that government intermediate output does exist, Hagen and Budd would use an index that makes no such concessions. From a welfare point of view the question should be raised as to which measure, in the absence of a list, should be used.

¹²Everett E. Hagen and Edward C. Budd, "The Product Side: Some Theoretical Aspects," in A Critique of the United States Income and Product Accounts, Studies in Income and Wealth, Vol. XXII (Princeton: Princeton University Press for National Bureau of Economic Research, 1958), p. 244.

CHAPTER III

THE QUESTION OF OCCUPATIONAL EXPENDITURES

The purpose of this chapter is to indicate the importance for economic welfare of occupational expenditures, and to point out some of the difficulties in identifying these expenses.

The question of the treatment of those expenditures made by an employee in connection with his work has long been an issue. From an operational viewpoint the treatment is clear. Such expenditures are regarded as consumption. From a theoretical point of view it is not at all evident that this is an acceptable treatment.

Consider two individuals who both work in an urban area. One worker lives near his place of employment and walks to work every day. The other worker lives further away and uses a transportation facility to get to work. Current treatment in the Accounts is to regard the purchases of the transportation service as consumption even though the individual may, and probably does, regard such purchases as a cost of employment.

Kuznets¹ has suggested that the reason why this is the treatment is because of the way that the worker is

¹Simon Kuznets, National Income and Its Consumption, 1919-1938, National Bureau of Economic Research (New York: H. Wolff, 1941), 1, 37-38.

regarded in the society. Thus, to treat the commuting expenditures as a cost of the individual earning an income is conceptually to treat the individual as an enterprise, whose intermediate purchases are the cost of his working and whose value of final product is his gross salary less these intermediate costs.

But if one is going to treat employees as separate enterprises, much like a firm is treated, then consistency would require that purchases of labour be treated as intermediate inputs to the firm that employs the labour. Accordingly, on the grounds of consistency, which is a fundamental accounting principle, the whole structure of the national accounts would have to be changed in so far as the recording procedure is concerned. In addition the distinction between final and intermediate goods would be further complicated; for example, the current test for final goods as "goods purchased not for resale" would no longer hold. Finally, to alter the Accounts in this manner would seriously limit the comparability of the accounts with previously published data.

But is it necessary to go this far? What of the possibility of presenting the accounts as they are currently presented, but in addition presenting a figure that represents the sum of occupational expenses. This additional figure could then be interpreted as 'forced consumption', that is, consumption expenditures that the consumer would not make if he could avoid making them because he receives no utility from such purchases.

Then the final total would be comparable with previous totals, and one could subtract twice the occupational expenditures from the total if one were sufficiently convinced that this figure did in fact represent intermediate consumption. The question then is that if one did perform the subtraction what would the new total mean and what purpose would it serve? The following is an attempt to ascertain this.

Hagen and Budd are of the opinion that if one wants a measure of productivity it would be incorrect to subtract from the total, as now presented, these occupational expenditures. They state, quite correctly, that "the value of the product that one worker helps create is not less than that of another (assuming both receive equal salaries) merely because the costs of travelling to work is greater for the first than for the second."² On the other hand, if what is required is a welfare measure, then the travelling expenditures should be deducted from the measure of income of individuals incurring them, or added to the income of individuals not incurring them.

While the rationale behind the productivity approach seems reasonable, at least based on the factor cost approach

²Everett E. Hagen and Edward C. Budd, "The Product Side: Some Theoretical Aspects," in A Critique of the United States Income and Product Accounts, Studies in Income and Wealth, Vol. XXII (Princeton: Princeton University Press for National Bureau of Economic Research, 1958), pp. 236-237.

discussed earlier, the welfare approach requires further discussion.

What has to be obtained is the choice of the consumer (worker) "under conditions freed from the pure calculation of job needs."³ What this means is that one needs to know how the worker would behave if he did not have to work but nonetheless received the income he would receive if he did in fact work. Then if by working he has to undertake an outlay that he would not make if he did not work this outlay is a cost of working. Although the reader has a right to feel uneasy about this formulation, it does in fact grasp the essence of the problem: the idea of free consumer choice. The author would however add a qualification to this 'Kuznets text', and that for the expenditures to be a true cost it must not be avoidable by the consumer. The significance of this qualification will be made clear later.

The desirability of subtracting occupational expenses from the output index, when that index is used for deriving welfare implications, is similar to the reason why intermediate output should be excluded. Thus, if occupational expenses change over time, or differ between economies, the changes in the output index within a country, or differences in the index between countries, will not enable meaningful welfare conclusions to be drawn about changes or differences in welfare.

³ Simon Kuznets, Economic Change, (New York: W.W. Norton & Co. Inc., 1953), p. 196.

There is, however, a difference between an intermediate good, as defined in the previous section, and an occupational expense. That difference is that while the value of an intermediate input is embodied in the value of some final good, an occupational expense is a final good itself. This distinction has no significance from the point of view of welfare, but it is important for generating an index of output. Thus from the welfare standpoint, both intermediate goods and occupational expenses should be excluded from the measure, but from an output standpoint intermediate goods should be excluded and occupational expenses included.

To return to the question of free choice mentioned above, the essence of the question has not been fully appreciated in the literature. For example, Hagen and Budd write,

Take for example the case of a worker who lives in the suburbs because he cannot afford space in town or because he dislikes living in the city, and who goes to considerable expense in money, to say nothing of time, travelling to and from his work ... if ... a comparison is made of the welfare of the individuals in the urban situation and the welfare of individuals elsewhere, the cost of travel should certainly be subtracted from the income of individuals in the urban situation.⁴

Unfortunately for this argument there is a world of difference between those who choose to live in the suburbs because they 'dislike living in the city' and those who 'cannot afford space in town'. And in any event Hagen and Budd's treatment is

⁴Hagen and Budd, "The Product Side," p. 236.

valid only if the individual wants to live in town but cannot obtain space.

Strictly speaking, to say that an individual cannot afford to live in the city means that given his budget constraint, to live in the city would take an amount greater than this budget. Accordingly such an individual really does not have a choice about where he is going to live. Nor is this an unusual situation: every consumer has preferences that extend beyond what he can feasibly obtain. This is the problem of scarcity.

With respect to the possibility that an individual lives in the suburbs by choice and another in the city by choice, consider two individuals who work for the same enterprise, and whose marginal productivities and salaries are identical. The only point on which the individuals differ is in their preference structure; that is why one lives in the city and one in the suburbs. Now the individual living in the suburbs has to incur transportation costs to get to his place of employment, and the question is whether these expenditures should be accounted for in calculating his real income. In this case, the reason that the two individuals do not live in the same place is, ceteris paribus, simply because their tastes are different. And this difference is embodied entirely in the shape of their indifference curves. Thus adjusting the money incomes would distort the picture by adjusting for something that has already been accounted for. It follows,

then, that the real incomes of the individuals is the same. Certainly the suburban dweller incurs transportation costs, but these are costs of living in the suburbs rather than working in the city.

There is another possibility, that being the situation where both individuals are identical in all respects, including tastes. Here both will live either in the city or in the suburbs. It will be assumed that both strongly prefer to live in the city.⁵ It is further assumed that for some reason, say an inelastic supply of city dwellings, that one of them must live in the suburbs. In this case the real income of the individuals is not the same. If one can imagine for the moment that the transportation costs can be added to the living costs, then the situation can be viewed as the suburban dweller purchasing what for him is an inferior product at a price greater than the superior product. If one now wishes to compare the real incomes of the two individuals then the transportation costs must be subtracted from the money income of the suburban dweller.

The reader will have noticed that the 'Kuznets test' has not been applied directly to this question of commuting expenses. This was intentional, and it is hoped that it is

⁵By 'strongly prefer' is meant that the price differential between city dwellings and suburban dwellings would have to be extremely large before the individuals could be induced to live in the suburbs. It is here assumed that such a differential does not exist.

clear that the reason for this lies in the author's qualification to the test. If in the case cited above where the individuals differ only in tastes, the Kuznets test were applied one would have to conclude that the commuting expenditures were a cost of living in the suburbs because under free choice the cost is avoidable - to avoid the cost he must simply move to the city. And since it is by choice that he lives in the country he cannot then claim anything save that the commuting expense is a direct consequence of that choice.

It is now possible to make clear exactly what is meant by a 'cost of living' rather than a 'cost of working'. To understand the distinction it is necessary to realize that the consumer is not simply asked "Do you prefer living in the country or living in the city?", which is the question that Kuznets would ask, but he is also told the money costs associated with his choice. He is told, for example, that if he chooses to live in the country he will have to incur transportation charges to the city (where he works). This latter information is taken into account when the individual makes his decision. The information is taken into account simply in the form of an opportunity cost of living in the country. Thus, the individual constructs a commodity bundle associated with a choice of living in the country, and a similar bundle should he live in the city. He then selects the bundle which yields him the greater utility. The cost of living in the

more expensive country is then the foregone consumption opportunities associated with that choice.

What then is the cost of working? In the opinion of the author it is those elements in the consumer's consumption bundle which are directly related to working and which yields zero utility to the consumer.

Having indicated the author's view of the matter it is possible to make more realistic, and more complicated, the example discussed above of the urban dweller and the rural dweller. Before proceeding, however, it is well to recall that there is no attempt here at interpersonal comparisons of utility. All that is being attempted here is a calculation of the income that an individual can use to purchase utility-yielding commodities.

Consider the situation where an individual works in the city and has a free choice either living in the country or of living in the city. Living in the country will mean, in this expanded example, lower rents than space in the city but transportation charges to the city. Living in the city, on the other hand, means higher rents but no transportation expenditures. What now has to be done is to separate any living expenses from any occupational expenses.

To show the proposed method of segregating the occupational expenses from the living expenses the following numerical example will be used.

Living in the country involves the following,

Rent in the country - per month	\$100
Transportation to work - per month	50
TOTAL	<u>\$150</u>

Living in the city involves the following,

Rent in the city - per month	\$130
Transportation to work - per month	.
TOTAL	<u>\$130</u>

It can be assumed, without loss of generality, that the individual prefers to live in the country, and does in fact live there. Now, in this case, if the consumer exercised his choice about where he lives, he would choose to live in the country. Therefore the country rent of \$100 certainly has nothing to do with his work. What remains to be accounted for is the \$50 difference between his total expenses and the rent figure. In the author's opinion \$20 of this difference should be allocated to living expenses, and \$30 to occupational expense. The rationale for this can be seen from the following, If the individual did not have to work he would incur expenses of \$100

Since he does have to work, the minimum expenses he could incur are \$130

The result of working and choice involve expenses of \$150.

Thus \$130 - \$100 must be the cost he incurs because he works, while \$150 - \$130 is the result of his choice of living in the country. One could then account for his total bill of \$150 in the following manner,

Basic living expenses - per month	\$100
Costs associated with choice - per month	20
Occupational expenses - per month	30
TOTAL	<u>\$150</u>

How should occupational expenses be treated in the Accounts? If a comparison is to be made of the real incomes of two individuals both living in the country, then one obviously does not have to make any adjustments to earned income. But if comparisons with third parties are to be undertaken, and if some of the persons live in the city, then adjustments are necessary. Two cases will now be considered.

The first case is where the third party has preferences different enough from those persons living in the country, so that he chooses to live in the city. Then continuing with the above numerical example, that person's occupational expenses are zero. The person living in the country by choice has occupational expenses of \$30. Then to compare the welfare of the two individuals one would have to subtract the \$30 from the income of the individual living in the country.

The second case is one where the individual, when freed from the calculation of job needs, would live in one location, but because of the costs involved in working, lives somewhere else. This situation might develop because, for example, the individual had miscalculated his expenditures on some necessary item, say food, with the result that he is forced to live in the (cheaper) city. All this means is that the cost of living in the country is such as to effectively remove that alternative from his field of choice.

Continuing with the numerical example, the fact that the individual now lives in the city does not mean that he

does not incur any occupational expenses. His occupational expenses must be the difference in the two rents. If this were not so one would have to say that, assuming one is drawing welfare conclusions from the output index, that the welfare of the individual living in the city by choice is the same as that of a person who lives in the city but would prefer to live in the country.

The question of occupational expenses can be seen to be fairly complicated. It is not enough to simply determine what the worker expends because he works, and compare that with what he would spend because he works, and then classify the difference as occupational expenses. One has to try and ascertain those expenditures made by choice.

One is now in a position to answer the question posed earlier as to what it would mean if national product was reported following the current procedure, and then one subtracted twice the occupational expenses from that figure. It would simply mean that one was of the opinion that the 'Kuznets test plus qualification' held. That is one would be satisfied that the figure to be subtracted represented pure occupational expenses, and if one were convinced of this then the subtraction should, of course, be made.⁶

⁶It is of interest to note that in the recent Canadian White Paper on Taxation that it is proposed that an income tax deduction be introduced which would allow employees to claim occupational expenses. One of the specifically excluded items that may not be claimed as an occupational expense are commuting expenditures.

CHAPTER IV

THE QUESTION OF EXTERNALITIES

What will be attempted in this chapter is to ascertain the implications for national income accounting if externalities exist in the economy. However a few comments will first be made regarding the nature of externalities.

The discussion which follows on the nature of externalities will be couched in terms of a producer - producer relationship. But it must be made clear that there is nothing sacred about this particular relationship, and that one could quite legitimately frame the discussion in terms of a consumer-consumer or a producer-consumer model. Given these possible relationships, the author will feel free to use examples of these latter types of relationships later in this chapter.

The literature on the subject of externalities, and their impact on the results achieved by the competitive system, abounds with sophisticated classifications of types of externalities: 'pecuniary', 'technological', 'technical', 'external'.¹ It seems however, and this is open to debate, that all these can be classified into two main groups: 'monetary' and 'real'. It may be that this classification will add nothing to the unravelling of the problem, but nevertheless for the

¹These terms are, respectively, associated with the names Viner, Viner, Bator, Scitovsky, and Mishan.

purposes here it will serve.

An externality will be taken to mean a situation where the actions of one economic agent, or group of agents. There is, then, an interdependence between agents which is a necessary condition for the existence of an externality. Now comes the classification of this interdependence. If the interdependence is such that the only effect is on costs or revenue functions, or, more generally, on profit functions,² then the externality will be called 'monetary'. If, on the other hand, the interdependence is between production functions, rather than cost functions, then the externality will be called 'real'. The results of these two types of externalities on the outcome of perfectly competitive mechanism are different. To illustrate this the examination must be carried further.

For the case of a monetary externality, consider the situation where consumer demand for an industry's output increases. It can be assumed that the derived demand for that industry's inputs will cause the price of such inputs to rise (say because the input is a produced input and not all firms producing that input are of the same efficiency. Alternatively one could assume a situation of increasing costs in the input producing industry).³ Then any industry that uses these

²Tibor Scitovsky, "Two Concepts of External Economies," Journal of Political Economy, Vol. 62 (April, 1954).

³If the discussion were not couched in terms of perfect competition then one could allow for increasing costs because of restricted entry or some other form of monopoly power.

inputs will now be forced to pay a higher price for them. The necessary condition of interdependence is present, and also the only impact is on costs. There is, then, a monetary externality.⁴

It has been suggested that in the face of externalities a perfectly competitive system will not attain a Pareto optimum state. That is, if the normal assumption of profit maximization by all firms is made, then each firm will maximize profits, but the result of this behaviour will be that the Paretian conditions for efficient resource allocation will be violated. Such a proposition does not apply in the case where the externalities are monetary.

The reason that there will not be a misallocation of resources is that this type of externality is signaled by the price mechanism, and therefore is, by definition, reflected in the price system. This kind of interdependence is, in a sense, the very essence of a competitive system. Certainly there will be a reallocation of resources in so far as the input producing industry will have to bid factors away from other industries so that they may produce the greater output, and consequently the output mix of the economy will change

⁴In this case there is a monetary diseconomy. One could equally well have talked of a monetary economy. For example, an increase in consumer demand for firm A's output will lead firm A to expand. This expansion will entail the use of additional inputs. If these inputs are produced under conditions of decreasing costs which are passed on to the buyer of the input, then firm A will find its cost curves shifting down. But the cost curves of all firms who use that input will shift down. There is, then, an external economy.

during the adjustment period, but this reallocation will cease when all factors are again paid the value of their marginal social product, i.e. a Pareto efficient allocation will be achieved.

Thus if there exists monetary externalities they are only a temporary phenomenon - a pre-equilibrium situation. Adjustment by the competitive system will fully account for them in its move to regain an equilibrium. Accordingly one need not be concerned with establishing an extra-market force to 'correct' them.

Before moving into a discussion of 'real' externalities a few explanatory points have to be made. Firstly the above, and what follows, is couched in terms of perfect competition. It is recognized by the author, and indeed by all economists, that a perfectly competitive economy does not exist in the 'real world'. Thus a far more realistic framework would be one in which there were degrees of monopoly power and in which a government operated. But the fact that perfect competition is unrealistic does not make an examination of that system, or an examination of the impact of externalities on that system, a meaningless exercise. On the contrary, the perfectly competitive model is in a sense an ideal, and an examination of the ideal is worthwhile. The ability, under free operation, and at least in the absence of real externalities, of the perfectly competitive system to achieve a Pareto optimum, and that fact that any Pareto optimum can be achieved by the

system provided the 'correct' choice of parameters (initial resource allocation and prices) is made, makes it the standard of comparability. It is against the results of a perfectly competitive model that all other systems are, in the western world at least, judged.⁵

Secondly, the discussion is in terms of a static partial equilibrium model. This is the form in which most of the discussions of external effects have been presented in the literature.⁶ It is true that there has been the occasional examination of externalities in a dynamic context, but these are not discussed here. And the author agrees with Mishan that failure to treat the dynamic aspects is not a serious oversimplification. Mishan notes that "the mere fact that the adjustment of supply to demand in all goods is being continually interrupted by changes in taste and technology is obviously not inconsistent with the key concept of the market as a mechanism of adjustment, a mechanism which, at any moment in time, produces prices that make for an equilibrium of the initial forces of demand and supply."⁷

⁵This should not be taken to mean that the competitive system is the only one capable of reaching a Pareto optimum. The competitive system is merely sufficient.

⁶Edward Mishan, The Cost of Economic Growth, (Middlesex, England: Pelican Books, 1969), p. 107.

⁷Ibid., p. 102.

To continue with a discussion of real externalities, the production function of the affected agent⁸ (the agent who suffers the externality of some other agent) may be impacted in one of two ways: by affecting the size of one of the inputs necessary to obtain a given output, or by adding an input or inputs into the production function so as to obtain the same output. To illustrate this, assume that the initial position is such that there is a firm whose production function is

$$Q = f(x_1, x_2, \dots, x_n)$$

where the x 's are quantities of inputs and Q is a quantity of output associated with the quantities of inputs. Another firm enters the economy and because the first firm suffers real externalities generated by the new firm, one of two things happens to the production function: either one or more of the inputs of the first firm increase or decrease in size while Q remains unchanged, or another input is added to or subtracted from the production function while the quantities of the original inputs and Q remains unchanged. In both cases the existence of real externalities in the economy has the result that for any quantity of output produced by the first

⁸The reader will recall that this discussion of the nature of externalities is couched in terms of the producer-producer relationship. One could, of course, make the necessary changes in terminology so as to talk of the consumer being affected by either a producer or another consumer.

firms it now takes a different quantity of inputs to produce the same quantity of outputs.

Now it should be clear from the above that in the case of the real externalities, if the production function is affected then, ceteris paribus, cost functions will also be affected. For example, the pollution of a river by an upstream firm means that a downstream firm which uses clean water and an input in its production process must now install a purification plant and thus incur a greater cost in producing its output - more inputs, in this case, means higher production costs. But these additional costs are not a result simply of the operation of the price system in the sense that monetary externalities are. In the case of monetary externalities the change in costs is due solely to the fact that price ratios changed; in the case of real externalities the change in costs is due to a change in real costs - it now takes a different quantity of inputs to produce the same quantity of output.

In the face of these real externalities the state of the economy achieved as a result of the profit maximizing behaviour of all firms will not be a Pareto optimal state. The operation of the competitive mechanism will misallocate the economy's resources.

To demonstrate this point, consider the case where firm A generates real externalities that are suffered by firm B. Under conditions of perfect competition, and given that

the externalities are not corrected, resource misallocation will result because firm A's output would be greater than it would be if it were made to account for the externality that it generates because the price of its output is lower than it should be. If output quantity of firm A is too large this implies that there are too many resources employed in firm A. Similar reasoning will show that the output of firm B is too low.

The key to the reason why the misallocation occurs is that if the actions of, say, a firm yields costs or benefits to others, and if these costs or benefits are not reflected in the price that that firm has no incentive to take them into account when formulating its profit maximizing behaviour. It is the fact that real externalities are not considered by the problem creating agent, which creates the misallocation problem.

A further aspect which should be mentioned briefly has to do with the redistribution of income which occurs in the face of externalities.

As indicated above, the existence of real externalities in the economy are left unaccounted for in the profit maximizing calculation of the offending firm. But the residue of costs has to be borne by the economy. In fact this residue is borne by third parties. That is, the costs fall on persons who are neither the producer nor consumer of the good whose

production generates the externality. To this extent there occurs a redistribution of income from third parties to the principles.

There is one final point that has to be made. Suppose one puts aside the problems of misallocation, mispricing, and redistribution effects mentioned above, and one poses the following question: Does it matter from the point of view of the real resources used, whether the agent causing the externality is made to account for it, or whether the agent who suffers the externality pays for it? In terms of the example of the pollution of the river, does it matter whether firm A (who pollutes) installs a plant to purify the outflow of dirty water, or whether firm B builds a plant to clean the inflow of dirty water? If it assumed that the costs of the two plants are the same, that there are only the two plants on the river who require inputs of clean water, and that the community is indifferent between a clear river and a polluted river, then it does not matter. The same real resources are expended by both firms.

Of course this is a limiting case and is generally unrealistic. A more appealing situation is one in which a firm pollutes a river while each of n -downstream firms require clean water as inputs in their production processes. Now in an atomistic environment each firm is unconcerned about its actions on other firms, and in particular the polluting

firm is unconcerned that the n -downstream firms require clean water. Since each downstream firm will only clean that portion of the polluted water which it itself uses, none of the firms, no matter how far downstream they are, can rely on intaking clean water directly from the river. Accordingly each firm will have to purify its own water intake. And if each firm installs a purification plant equal in cost to the cost of installing a plant to purify the outflow of the polluting plant, then the real costs to the economy of water purification will be n -times what they need be. Obviously in this case it does matter who cleans the water.

Having made this brief excursion into the nature of externalities their import for the National Accounts will now be examined.

Consider the following hypothetical situation. A factory is constructed on the outskirts of a small town. A by-product of the factory is large volumes of a soot-laden smoke. When the wind is from the north, which it is during most of the year, the smoke hangs over the town. Not far from the town is a recreational area whose main attraction is a beautiful view and clean air. When the wind is from the south, which it is during the summer (vacation) months, the smoke hangs over this area.

From the point of view of the National Accounts, the investment (new) in the factory's plant and equipment will

obviously go to increase the size of the national product, as will the value of the marketed or marketable output of the factory.

The fact that the emission of smoke necessitates an increase in the frequency of housecleaning and housepainting outlays also increase the size of national output. And so it is with any additional medical outlays due to the detrimental effects of the smoke on the health of the community.

And what if the smoke has a permanent detrimental effect on the members of the community, an effect that has no productivity implications, but rather affects the enjoyment of life that individuals can attain?⁹ This important element is entirely omitted from consideration in the Accounts, as is any loss of 'phychic' income that results from the pollution of the air and the destruction of the view in the recreational area.

Now the economy most certainly produced the additional housecleaning, painting, and medical services during the year. And if one wants a measure of output then these items should be included in that measure. As far as the loss in psychic income is concerned, this is not a loss of output as defined in the Accounts. But what is of concern for this paper is the welfare connotation: Gross National Product has increased, has welfare also increased?

⁹This introduces the idea of a producer-consumer relationship.

As far as welfare is concerned, the following points have to be considered:

- 1) There should be no adjustment to the Accounts if externalities are of the monetary type. The economic system accounts for these.
- 2) In the face of real externalities the mispricing of products implies that the market prices can no longer be taken as indexes of marginal utilities. (It will be recalled that this is the rationale for the market price valuation).
- 3) If the situation is one of product-plus-no-smoke last year and product-plus-smoke this year, then any production required to cope with the smoke should be deducted from the Accounts for this year. Failure to do this will show an increase in the national output while welfare remained exactly the same.
- 4) If smoke is a necessary by-product of the good produced, then if last year one had the product-plus-smoke, this year one should have the same thing. To deduct the smoke this year would result in a decrease in national product while welfare remained the same.
- 5) If the structure, and the resultant real costs, of dealing with an externality change over time, then these changes should be accounted for. For

example, consider again the example of the upstream firm which pollutes the river. If last year the upstream firm depolluted its effluent, and thereby incurred a certain cost, that cost would be included in last year's Accounts. This year, however, the n -downstream firms have to depollute their inflow because the polluting firm has ceased its purification process. The new cost of depolluting the water is n -times the old cost. The change in real costs should be excluded from this year's Accounts. Should this not be done, the result will be that there will be recorded an increase in national product while welfare, again, will remain unchanged.

- 6) If last year there was smokey air, i.e. there was no cleaning of the air at all, and this year the air is cleaned, then the treatment should be to include the cleaning of the air this year if the assumption is that people prefer clean air to dirty air. (This in fact, must be the case otherwise why clean the air at all?) With clean air, welfare has increased.
- 7) The results of resource misallocation due to uncorrected externalities cannot be accounted for without the aid of a computer to determine what the situation would be if the externalities were

corrected. In other words, one needs to know the shadow prices.

There are two main points that should be gleaned from the above. Firstly, the method presently used to account for externalities as indicated by the example of the smoke, is such that it indiscriminately concentrates on production. Under certain circumstances (cases #4 and #6 above) this is permissible. In the other cases it is not. Further, there is no way to account for the loss of psychic income until the preference structure of the community is revealed. That is, last year there was clean air but there was no value associated with this in the sense that preferences were unrevealed. This year there is dirty air about which nothing is done. Again there are no preferences revealed. The National Accounts show the same product for the two years, but welfare has fallen if the people do in fact prefer clean air to dirty air. What this means is that as presently formulated the Accounts become less and less accurate measures of welfare as external diseconomies increase and when preferences are not revealed.

The second point, which really follows from the first, is that policies which are formulated with a view to their impact on the size of the Gross National Product does not necessarily imply maximization of social welfare.

CHAPTER V

THE QUESTION OF CAPITAL FORMATION AND DEPRECIATION

Although a start has been made, as at the present time Canada does not have either a national balance sheet or a national wealth statement.¹ The National Accounts do not however totally ignore the question of capital; on the product side of the Accounts is found the item "Capital Consumption Allowances and other Miscellaneous Valuation Adjustments" and on the expenditure side are the entries "Business Gross Fixed Capital Formation" and "Government Gross Fixed Capital Formation."

What will be attempted in this chapter is to answer just two questions. Firstly the question of how these concepts of capital formation and depreciation are defined in the Accounts and how widely they are applied, will be discussed, and, secondly, what interpretations should be given

¹The relationship between balance sheets and wealth statements is that a national balance sheet is a combined balance sheet of all units in the nation, while the national wealth statement is their consolidated balance sheet.

The main difference between the two statements is the treatment of the creditor-debtor and stockholder-issuer relationships. Thus, all claims and liabilities arising from the relationships are preserved in the national balance sheet but cancel out in the wealth statement.

For the present state of the statements in Canada see Thomas K. Rymes, "National Wealth Measurement in Canada," in Measuring the Nation's Wealth, Studies in Income and Wealth, Vol. XXIX (New York: Columbia University Press for National Bureau of Economic Research, 1958), pp. 219-225.

to the published figures if one is going to use the Accounts for welfare purposes.

From the operation viewpoint "the definition of fixed capital formation for the National Accounts is framed in terms of the tangibility and durability of the goods in question."² Accepting this basis, additions to fixed capital "may take the form either of adding to the stock of new residential buildings, new non residential buildings and other construction, or new machinery and equipment".³ In addition, "expenditures of persons for new residential dwellings (including garages and major improvements and alterations) are also included, since individuals in their capacity as home owners are treated as business enterprises".⁴

From a more theoretical stand, one of the essential characteristics of a capital good is its ability to yield a stream of values over time. That is, the value contribution of a capital good is not a once-and-for-all affair such that its entire value is used up at a point of time. This property is accepted in the Accounts in that it is implied by the requirement that the goods included in capital formation be durable. In addition, capital goods are 'produced means of production'. That is, they themselves are a result of a

² Dominion Bureau of Statistics, National Accounts Income and Expenditure, 1926-1956 (Ottawa, Ontario: Queen's Printer and Controller of Stationary, 1958), p. 112.

³ Ibid., p. 107.

⁴ Ibid., p. 109.

production process and will be used, in their turn, in a production process. This proposition is also accepted in the Accounts. The fact that capital goods are produced is implied simply by the fact that they are recorded as a 'plus' in the Accounts. The fact that they will themselves be used in a production process is implied by the ownership of the goods residing in the productive sectors. (It is assumed, presumably, that business would not hold an asset save for its productive capabilities. As far as the government sector is concerned, government, at least theoretically, has as its objective the provision of services to the population, and its ownership of buildings etc. is necessary to achieve this end.)

Based on this very imperfect sketch, except for "expenditures of persons for new residential dwellings", all the included items in the Accounts conform to this more theoretical idea of capital - all items are durable and reside in the productive sectors. However, it appears that there are certain items which are excluded from the measure of new investment.

In order to illustrate this latter point the question of household acquisitions of capital assets will first be discussed. The question of the depletion of natural resources will then be examined, since this area is both topical and, hopefully, can be used to shed some light on the problem of depreciation. Finally, the distortions that can arise when

the business accountant and the national accountant disagree on what is to be regarded as capital formation and what is to be regarded as current expenses will be examined. It will further be shown that the treatment of capital in the Accounts is such as to make them an unrealistic measure of output, and to make welfare conclusions drawn from long-run changes in that measure inappropriate.

The Household

The fact that residential dwellings that are owned by the occupant are included in capital formation is unusual in that it is the only entry under capital which resided in a sector which is generally regarded by the national accountant as non-productive. That is, an individual as a factor of production is productive, but an individual as a consumer is not productive. And it is as a member of this latter category that the individual is 'accounted' for in the Accounts. In the case of the owner of a dwelling, the treatment is to remove the owner to a productive sector. This is achieved by simply indicating that individuals "in their capacity as home owners are treated as business enterprises."⁵ The rationale behind this is that the homeowner performs an activity very similar to a market activity, namely, the activity of owning a home and renting it. The specific treatment, then, is to

⁵Ibid., p. 109.

regard homeowners as landlords "who rent to themselves and their landlord activity is included in the business sector."⁶ The new dwelling is then treated as gross capital formation and an amount imputed for rent and depreciation.

Such a treatment is an admission, firstly, that business and governments are not the only entities capable of acquiring these productive assets, and secondly, that the household can be productive.

Now the problem is not so much that the homeowner is regarded as productive but rather why household productivity is restricted to homeownership. There are many other household activities that are similar to a market activity, and indeed many of these activities involve the use of goods that if purchased by business would be regarded as investment. For example, consider the man who has a home workshop and who makes his own furniture. Is this not similar to the activity of the professional carpenter who has an identically equipped shop and who makes furniture for sale on a market? The answer is, of course, 'yes'.

Consistency would indicate that if one is going to include the situation of the owner-occupied dwelling in the Accounts as though this were a simple business enterprise on the basis that this activity has a close analogue in the

⁶Ibid., p. 129.

market place, then one should also include the activity of the amateur furniture builder. However, if one followed the rule of consistency, then one would be forced to extend the meaning of production beyond that which is currently accepted. One would have to include almost all that which is classified as 'general activity', and as been indicated, the Accounts do not seek such coverage.

Nevertheless the fact remains that as presently reported the investment figures understate the changes in the stock of capital goods by the amount of these purchases of productive consumer durables. And unless one is prepared to extend the definition of economic activity there is no way to correct this understatement.

From a welfare point of view, the fact that the purchase of consumer durables is treated as consumption purchases makes changes in the index of output a poor measure of welfare, for the reason that the index does not include any measure of depreciation associated with the using-up of the durables. In order to make this clear, consider what happens. In the year of production of, say, a washing machine, the full value of the washing machine is included in the Accounts as consumption expenditures (or if it is not sold in the year of production, as inventories). But the consumer does not consume the entire value of the washing machine in the year that it is purchased. The washing machine yields a

stream of values over time. But it wears out. So when the machine has yielded its stream of values it has to be replaced. Now when the new washing machine is purchased it also will be entered as consumption. But really nothing has happened to welfare. Now if the machine were capitalized and depreciation was charged, then each year the depreciation figure would be subtracted from the figure for new consumer durables thus indicating that some of the new durables were to replace those that have been used up.

If, over time, purchases of consumer durables remains a fairly constant proportion of total consumption purchases, then it could be argued that the inclusion of durables in consumption does not distort changes in the output index that much. But if the mix changes over time, or is different between economies, then the changes or differences in the output figures will be distorted as will any welfare conclusions drawn from those indices.

The Depletion of Natural Resources

Such enterprises that are involved in the depletion of the nation's stock of natural resources are permitted to deduct a depletion allowance in the calculation of their taxable income. In the National Accounts such an allowance is added back to the figure presented to the Department of National Revenue in order to obtain the National Account's figure "profits before tax". The reason given for this treatment

(of adding back the allowance) is that "depletion ... is not regarded as a charge against National Income."⁷

On the other side of the Accounts, the discovery value in excess of discovery costs of a new natural resource is not regarded as an addition to fixed capital formation, and is therefore omitted from that figure.

The inclusion of depreciation in the gross concept of national output represents double counting.⁸ To the extent that the discovery value in excess of discovery costs of a natural resource, hereafter called the 'excess value', is not included in gross capital formation, then deduction of depletion would not remove any double counting. Indeed such a deduction, where it to be made, would result in an understatement of the value of output.

⁷Ibid., p. 114.

⁸There are two reasons why depreciation can represent double counting.

- 1) A capital good produced in this period is used in the production of other goods this period. The full value of the capital good is included in gross capital formation and that portion of the capital used up in the production of other goods is included in the value of these goods.
- 2) A capital good produced in a previous period is used in the production of other goods this period. The full value of the capital good is included in the output of the previous period and that portion of it that is used up this period is included in the value of goods this period. Again there is duplication of the 'used up' portion.

The question remains, however, as to whether the excess value should be included in gross capital formation, and depletion included in the capital consumption allowance, for if one does either one will have to do both.

If one accepts the definition of capital used in the Accounts then there is obviously no argument: the excess value does not constitute an addition to the stock of buildings or other construction, or to machinery or equipment. It follows, then, that there should be no deduction for depletion because there is no duplication involved.

If, on the other hand, one views the question of depreciation not as a measure of the duplication of values, but rather as a measure of the amount of replacement that needs to be made in order to maintain the economy's ability to produce the goods and services that were produced in the given period, then in the case of a resource it would appear necessary to add a gross fixed capital formation the excess value, and to capital consumption allowance an amount equal to the depletion.⁹ If this is not done then one cannot place the interpretation on capital consumption indicated above: the economy could fully deplete its natural resources without it showing up in the Accounts, with the result that the economy

⁹The Accounts indicate that the item for capital consumption allowance represents a deduction of output necessary "to replace capital used up by wear, tear, obsolescence, or other destruction during the period", D.B.S., National Income, p. 111.

may not be able to duplicate the output mix produced during the period.

There is, however, an enigma here. The enigma is simply that if the resource is a non-renewable or irreplaceable natural resource then how is it possible for man to replace it? Put another way, fixed capital formation, as presently interpreted by the Accountant, covers produced means of production - items that are reproducible by man. Then the capital consumption allowance can be taken as a fund that can be used to replace the items used up during the production process; thereby maintaining intact productive capacity. But the depletion fund cannot in fact be used to duplicate an irreplaceable natural resource precisely because the resource is irreplaceable.

In the opinion of the author this enigma is more imaginary than real, and can be resolved by not placing too strict an interpretation on the fund. Thus one can view the fund as a measure of the amount of productive resources that need to be replaced in order to maintain the economy's productive capacity, without concerning oneself with whether or not the fund is in fact used for that purpose. Nor, on reflection, is this approach without some empirical support - the economy does not replace, year after year, the actual capital that is used up in the production process. What is being said, then, is that in the interpretation of depreciation the emphasis should be placed on the value of capital goods that need to

be replaced rather than the form in which the replacement should take place. On the basis, then, including depletion in the capital consumption allowance would not introduce any additional interpretative problems in this latter measure.

From a welfare point of view, the treatment of capital, like the treatment of any other items, depends upon whether the consumer receives positive utility from the item. The present treatment of including capital in the measure of output must mean that the consumer obtains satisfaction from the fact that the economy has a stock of future values in the form of capital. But if this is true why should such satisfaction from the fact that the economy has a stock of future values in the form of capital. But if this is true why should such satisfaction be restricted solely to produced means of production? Why is it not extended to cover the value of, say, a new oil field or mineral deposit? The author finds it difficult to accept the restriction implied by the fact that natural resources are excluded from the Accounts, and for this reason it is recommended that the excess value of new discoveries be treated as new investment.

Another point that should be considered is that the fact is that some resources are fully depleted over time. Suppose that a natural resource was fully depleted, and resources were re-allocated to find a substitute. The output index may well increase as a result of this effort, but it is, at least, questionable as to whether welfare has also increased.

It is admitted that there are problems associated with acceptance of the idea that depreciation measures the amount of capital that needs to be replaced, and with the proposition that the excess value of natural resources be included in capital formation. For example, if one accepts the idea of the nature of depreciation as above, then one can go a step further and argue, as Ruggles has done, that

if capital consumption is interpreted as measuring the loss in productive capacity due to the deterioration of existing capital goods during a given year, this loss may be smaller than is usually calculated, or may even be non-existent, since technical progress generally results in the replacement of old assets with more efficient ones. Suppose, for example, that an invention results in the scrapping of an old machine and its replacement by a new one (of the same cost) capable of doubling the output of the former. In this case, no loss in productive capacity has occurred, and hence no deduction for depreciation over the life of the original machine would be justified.¹⁰

As Hagen and Budd indicate, the treatment implied by Ruggles involves the extension of the concepts of production and output accepted in the Accounts to include productivity changes. They view the situation as one in which there are really two production functions - one operating before the technological change and one operating after it.

¹⁰Everett E. Hagen and Edward C. Budd, "The Product Side: Some Theoretical Aspects," in A Critique of the United States Income and Product Accounts, Studies in Income and Wealth, Vol. XXII (Princeton: Princeton University Press for National Bureau of Economic Research, 1958), p. 246.

The question is, then, should the pre-change function be modified to account for the technological change (as Ruggles suggests), or should one simply switch over to the post change model the moment that the technological change occurs? They prefer the latter method on the basis that accepting the Ruggle's solution not only involves the extension of the production concept, but also would mean that one might confuse a change in the structure of the model with a change in the operation of the model.¹¹ The author finds it difficult to find fault with this position.

But there is a further problem. The quotation above indicates that the cost of the more productive machine may be the same as the cost of the less productive machine. That is, the resources used to produce the two machines is the same. But the question can be raised as to whether one wants these costs at all in the measure of output. To clarify this point one has to realize that one of the main statistical sources for the investment and depreciation figures presented in the Accounts are the statements prepared by business. These statements record the value of assets as the price paid by the business to acquire the asset. But this is not the same as economic value. The economic value of an asset is the present

¹¹ Presumably Hagen and Budd would account for the technological change, in the case where the cost of the two machines is the same, by simply extending the depreciation period of the more productive machine.

value of the flow of future income that it yields. On this basis the cost of the two machines can only be the same if, given constant and equal output prices, the productivity of the two machines is the same.

If capital were valued as the economist would wish, and accepting the Hagen and Budd argument that the pre-change model should not be modified to reflect productivity changes, then the increased value of the new investment would immediately indicate the increased productive potential of the economy. It would further mean that the value of capital would more closely reflect a market valuation which, it has previously been shown, is the more desirable valuation measure for welfare considerations.

Clearly one of the problems that will be encountered in including the excess value of natural resources in the Accounts is that of measuring the excess value. To value the excess value on the basis of discounted future yields means that one needs to know the discount rate, the life of the resource, annual sales, and market prices. With the exception of the discount rate these requirements will have to be calculated individually for each new resource as it is discovered, for it is unlikely that the information on, say, an iron ore deposit can be used for a uranium deposit. Further, should a new kind of resource be discovered there will be no empirical evidence on which to call for information on market prices, resource life, or annual sales. Obviously a great deal of

will have to be done before inclusion of the value of natural resources in the Accounts can be realized.

Capital Items Which are Expensed by Business

The objective of this section is to illustrate the problems that can arise when there is disagreement between the business accountant and the national accountant as to whether an item should be treated as a capital item or as a current expense.¹²

If a capital item is expensed by business and the item is not, in fact, fully depreciated during the year of purchase, and should the national accountant accept this business treatment, then both gross and net output will be understated. The gross figure will be understated by the full amount of the asset, and net will be understated by the amount of the undepreciated value of the asset.

The national accountant does not in fact accept the business treatment, and the procedure is to add to gross fixed capital formation an amount equal to the value of the asset. In order to strike the balance between the two sides of the Account, the same amount is added to the income side entry for depreciation. The assumption is, then, that the full amount of the asset is depreciated during the year of purchase.

¹²There may not be any deep philogophical reason for the different treatments - taxation laws may dictate the business treatment.

This treatment ensures the correct figure for capital formation insofar as the outlay was a capital outlay rather than a current expense. It therefore, also ensures the correct figure for the value of gross output. Net output, however, remains understated by the amount of the undepreciated value. The reason for the incorrect figure of corporate profits. That is, business profits will in fact be greater than that reported by business profits will in fact be greater than that reported by business by an amount equal to the undepreciated value of the expensed asset. Of course in the case where there was actually 100% depreciation, that is the assumption made in the Accounts is a true statement of reality, then the figures presented in the Accounts are correct in all respects.

Over time economies have tended to become more and more industrialized - output has become more capital intensive. In view of this fact it would appear to be preferable to use an output index net of depreciation to evaluate long-run changes in output. But it has been shown that this index is not invariable to changes in the conventions and laws governing the treatment by business of capital expenditures. From a welfare point of view this means that any long-run changes within an economy that are deduced from changes in the output measure will be biased if tax laws, say, change over time. International comparisons of welfare will also be biased if tax laws change.

CHAPTER VI

CONCLUSIONS

The foregoing has been an attempt to illustrate the proposition that the output figures presented in the National Accounts are inadequate, as they now stand, for drawing long-run welfare conclusions either about changes in welfare within an economy, or differences in welfare between economies. The reasons for this inadequacy are, basically, three: statistical reasons, conceptual reasons, and reasons emanating from the fact that the Accounts only measure output and omit consideration of other related aspects of economic activity.

By statistical reasons is meant that the basic source data used to compile the Accounts are, in many cases, not collected specifically for use by the national accountant. Thus, Jaszi has noted that

Most of the sources of data that are utilized in the National Accounts are either general purpose or administrative statistics ... Given this situation the task involves piecing together information gathered from a multiplicity of sources, and often having an indirect relationship to what it is desired to measure.¹

As examples of the impact that this has on the Accounts one can cite the problem of having to use factor cost valuations

¹George Jaszi, "The Statistical Foundations of the Gross National Product," Review of Economics and Statistics (May, 1956), p. 207.

rather than market price valuations when one would prefer the latter, or of having to use cost figures as a measure of output. On this latter count the expenditures on, say, health services by government are what are recorded in the Accounts, but what one really wants to know is the yield of the expenditures - one wants to know whether the nation is healthier and how much healthier it is. What one requires are measures of effectiveness.

The question of externalities, and the fact that they are mistreated in the National Accounts is, in the opinion of the author, one of the most, if not the most, serious deficiency present in the series. The reason for the mistreatment is, again in the opinion of the author, a lack of statistical information on the matter rather than a conceptual problem. It seems that the only justification for their exclusion from the Accounts could be on the grounds that these externalities are outside the domain of definition. But this is hardly a tenable position in view of the fact that many of them are a direct result of the functioning of the economic agent within the economic system.

The conceptual problems encountered in the National Accounts fall into two broad categories. The first category involves questions of whether to include or exclude certain items. The second category involves the question of how to measure certain items. As examples of the first group can be cited the question of whether to include the depletion of

natural resources, or how to separate, if separate at all, the final from the intermediate output of government. As examples of the second group one need simply indicate that one requires a measure of the effectiveness of health expenditures but how does one go about measuring such effectiveness?

The problems arising from the limited coverage of the Accounts present a serious drawback to using the output measure as a measure of social welfare. Social welfare in general encompasses a broad spectrum of consideration. If social economic welfare is taken to mean that aspect of general welfare that is measured by the Accounts, then one has to realize, firstly, that the Accounts only imperfectly measure this aspect, secondly, that the area of non-economic welfare is increasing in relative size, and thirdly, that if the objective of society is to maximize social welfare in general, that maximization of the aspect covered by the Accounts may in fact decrease total general welfare. The Accounts simply leave out too many things that are important to the nation's well being - "they leave out most of the things that make life worth living ... They neglect the pollution of the environment, the deprivations of crime, and the toll of illness."²

²Mancur Olson, Jr., "Toward a Social Report: The Plan and Purpose of a Social Report," The Public Interest, Spring, 1969, p. 86.

But there is a further, and far more potentially dangerous, problem that one has to be aware of. Bertram Gross puts it the following way,

The highly quantitative economic data of today's economic survey documents tend to detract attention from ideas that cannot be so readily expressed in quantitative terms ... Economic statistics, on the whole, emphasize the monetary value of goods and services. By so doing they tend to discriminate against non-monetary values and against public services for which costs invariably serve as surrogates of output values ... In short national economic accounting has promoted an approach to life based on the principle of using monetary units as the common denominator of all that is important in human life.³

So if one wants to have some measure of social well being where does one turn? There seems to be at least two alternatives, though not mutually exclusive, possibilities. On the one hand, one can revise the Accounts so as to reflect more comprehensively economic welfare. This would mean undertaking the considerable task of evaluating, item by item, each

For a fairly comprehensive set of articles on the measurement of economic welfare see Part V of Kenneth J. Arrow and Tibor Scitovsky, eds., Readings in Welfare Economics, The Series of Republished Articles on Economics, Vol. XII (Homewood, Illinois: Richard D. Irwin, Inc., for American Economic Association, 1969). Also, C. Hillinger, "The Measurement of Utility," Review of Economics and Statistics, Vol. (Jan., 1969), 111-116.

In the development of social indicators measurements in terms other than monetary have been used. See, for example, S.M. Lipset, The First New Nation: The United States in Historical and Comparative Perspective (New York: Basic Books Inc., 1963), and see also, United States Department of Health, Education, and Welfare, Toward a Social Report (Washington, D.C.: United States Government Printing Office, 1969).

³Bertram Gross, The State of the Nation (London: Tavistock Publications, 1966), pp. 18-19.

of the entries in the Accounts, determining whether the item should be included, if included how it should be valued, the statistical problems associated with obtaining the required information, and the problems of imputation that are likely to arise. Then one would have to address oneself to the myriad of possible items that could be included, and are not at present included, and determine whether these should be included. What this approach really implies is starting from scratch and building a whole new series.

The other approach would be to generate a new additional statistical series. This approach has the merit that a start has already been made, at least in the United States, along these lines. In that country the so-called 'social indicators' are gaining importance. The role of these indicators has been explained as follows,

Ideally, what the national income statistics leave out, social indicators ought to measure, and a social report ought to assess. The social gains and losses that the National Income does not measure, at any event properly, are not only important to our well being, but often also are of particular concern for public policy.⁴

It may then be possible to integrate information contained in the Accounts with that yielded by these social indicators so as to form a more meaningful picture of the welfare of the community. What is, however, clear is that at the present time the National Accounts are insufficient for this purpose.

⁴Olson, Jr., "Toward a Social Report," pp. 86-87.

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APPENDIX I

A mathematical exposition of how the existence of real externalities result in a misallocation of resources has been presented by, among others, Bator.¹ The essence of his presentation is recorded in this appendix.

The assumptions are,

1. There is all-round perfect competition.
2. There is a fixed quantity of one factor of production (labour).
3. Production is carried out under non-increasing returns to scale. (Increasing returns are incompatible with perfect competition.)
4. Two goods are produced: Apples and Honey.

The production functions are,

For Apples: $A = A(L_A)$.

For Honey: $H = H(L_H, A(L_A))$.

Profit maximization requires that labor be paid the value of its marginal product, that is,

$$w = P_H \cdot \frac{\partial H}{\partial L_H} \quad \text{and} \quad w = P_A \cdot \frac{\partial A}{\partial L_A} \quad \dots \quad (1)$$

¹Francis M. Bator, "The Anatomy of Market Failure." The Quarterly Journal of Economics, (August, 1958).

where the left hand terms are the values of the private marginal product.

An implication of a Pareto optimal state is that the collection of finished goods, valued at the prevailing prices, has a higher value than that of any other alternative collection of goods that could be produced. Then to find the Pareto optimal one solves the following,

$$\text{maximize: } P_H \cdot H + P_A \cdot A$$

$$\text{subject to: } L = L_A + L_H \text{ and the production functions.}$$

Setting up the Lagrangian expression and solving yields the following conditions,

1. For the Apple producer.

$$w = P_A \frac{dA}{dL_A} + P_H \frac{\partial H}{\partial A} \cdot \frac{dA}{dL_A} \dots \quad (2)$$

2. For the Honey producer.

$$w = P_H \frac{\partial H}{\partial L_H} \dots \quad (3)$$

Where the Lagrangian multiplier is interpreted as the wage rate. Here the left hand expressions are the marginal social products.

In the case of the honey producer all is well: he does for profit maximization what he must do for efficiency.

In the case where there are no externalities - which is the situation where $\frac{\partial H}{\partial A} = 0$ - then the apple producer also does for profit maximization what he must do for efficiency. But in any other case this is not true. If there are external -

i.e. $\frac{\partial H}{\partial A} > 0$ - then since he sets

$$w = P_A \frac{\partial A}{\partial L_A} \dots \quad (4)$$

it follows that

$$w < P_A \frac{\partial A}{\partial L_A} + P_H \frac{\partial H}{\partial A} \frac{dA}{dL_A} \dots \quad (5)$$

That is, the wage rate is less than the value of the marginal social product. To correct the situation he should hire more labor and therefore produce more. The reverse is true if $\frac{\partial H}{\partial A} < 0$ - if there are external diseconomies.

Now what of prices, will these reflect the externality? What the competitive system brings into equality is the marginal rate of transformation (MRT) with the commodity price ratios. That is it ensures that,

$$\frac{MC_A}{MC_H} = \frac{P_A}{P_H} \dots \quad (6)$$

In so far as the two producers are profit maximizers, the equality that is in fact achieved is

$$\frac{\frac{w}{\frac{\partial A}{\partial L_A}}}{\frac{w}{\frac{\partial H}{\partial L_A}}} = \frac{P_A}{P_H} \quad \text{thus,} \quad \frac{\frac{\partial H}{\partial L_A}}{\frac{\partial A}{\partial L_A}} = \frac{P_A}{P_H} \dots \quad (7)$$

But what efficient allocation of resources requires is that

$$\frac{\frac{\partial H}{\partial L_H}}{\frac{\partial A}{\partial L_A}} = \frac{P_A}{P_H} + \frac{\partial H}{\partial A} \dots \quad (8)$$

And since prices are determined by expression (7) and not expression (8) then market prices do not reflect the true social costs.

APPENDIX II

The purpose of this note is to examine the proposition that it is valid to expect that national income can yield information concerning social economic welfare. That is, notwithstanding the problems and deficiencies of arriving at a figure for national output, what is the rationale for entertaining the idea that it is possible to draw welfare conclusions from income data.

The problem can be made more explicit. In economic theory it is conventional to write an individual's utility function in explicit form. That is one writes, for example,

$$U = U(x_1, x_2, \dots, x_n)$$

read "The utility of man i is some function of the goods and services that he consumes, or selects, under conditions of free choice." In turn a social welfare function is also written in explicit form, and is a function of the individual utility functions of the group whose social function one is constructing.

The basic mechanics of the construction is to select for each individual a particular value for U , and write the function in the form

$$W = W(U_1, U_2, \dots, U_i, \dots, U_m)$$

for the n -individuals in the group. Thus behind the social

welfare function are the individual preferences for the particular goods and services. Thus welfare and utility, the psychic things, are defined in terms of goods and services, the physical things. This, it is argued, is the reason for the explicit form of the functions.

But this in no way should be regarded as a causal relationship. The functions are intended to describe rather than explain. Accordingly it is invalid to make statements to the effect that a change in the quantity of goods and services yields a change in utility. In the case where utility is defined in terms of goods and services, 'utility', on the one hand, and 'quantity of goods and services', on the other, are not two separate series of events. As Frankel points out, "an increase or decrease in the amount of goods and services does not affect his total welfare, except only by the increase or decrease in the amount of those goods and services themselves."¹

The point is that income, which can be interpreted as the vector of x 's in the individual's utility function, is one entity, while utility, or welfare, is another. They do not belong to the same set of entities. Thus "when we have measured the amount of goods and services produced in a society, we cannot then proceed to speak about the increase

¹S. Herbert Frankel, "'Psychic' and 'Accounting' Concepts of Income and Welfare," Oxford Economic Papers (Feb. 1952), p. 4.

as causing a further increase in the welfare of society,"² - "society's welfare is not a counterpart of its goods and services."³ The exception is, of course, where welfare is defined in terms of goods and services, in which case to speak of a change in the amount of goods and services is to speak, by definition, of a change in welfare. A change in the former is necessarily a change in the latter. But note that even in this case one does not say anything about causation.

Perhaps an example may help elucidate the point. Imagine a society whose members value the hunt. That is, the activity of hunting is, itself, what is enjoyed. To evaluate the welfare of that society by examining the number of animals killed could hardly be said to be an index of that community's welfare. And to compare the number of animals killed in that society with the number of animals killed in another society which does not value the chase, and then draw welfare comparisons is patently invalid.⁴

²Ibid., p. 5.

³Ibid., p. 5.

⁴Ibid., p. 6.

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